

cheques signed by such members of the Executive Committee as may be authorised by the Committee to do so.

Legal Proceedings.

Any legal proceedings with regard to the affairs of the Institution, which it may become necessary to institute or defend, shall be instituted or defended by the Solicitors of the Royal Society, in the name and on behalf of the Royal Society upon the instructions of the Executive Committee, but no such proceedings shall be instituted or defended without the order of the President and Council of the Royal Society.

The Kew Observatory Committee of the Royal Society.

"The Kew Observatory Committee of the Royal Society," incorporated under the Companies Act, 1867, shall be wound up; and the property thereof shall be held by the Royal Society for the purposes of the Institution.

CHEMICAL TECHNOLOGY.

Outlines of Industrial Chemistry. A Text-book for Students. By Frank Hall Thorp, Ph.D., Instructor in Industrial Chemistry in the Massachusetts Institute of Technology. Pp. xx + 541. (New York: The Macmillan Co. London: Macmillan and Co., Ltd., 1898.)

IN writing a book such as the present, the author's main difficulty must be in deciding what to omit. The number of industries in which chemistry plays a more or less important part is so large, and their nature so varied, that it would appear to be almost impossible to give even a moderately satisfactory account of them within the limits of one volume. By omitting metallurgy altogether, and condensing the preparation of the artificial organic dye-stuffs into a little over eight pages, the author succeeds in finding space for the essentials of the majority of the remaining chemical industries. The omission of metallurgy is justified by the facts that this subject is usually taught independently, and that several good short text-books dealing with it already exist. The chemistry of the artificial organic colouring matters is generally included in courses of lectures on organic chemistry, and, presumably for similar reasons, no mention is made of the majority of the pharmaceutical and photographic chemicals.

An introductory section contains a general account of the apparatus employed in performing such common operations as evaporation, filtration, distillation, calcining, and so on, on the large scale. The diagrammatic sketches employed in this section, and throughout the book, are very clear and are calculated to be of much more service to a student than elaborate illustrations of the outside of the apparatus or even complicated working drawings would be. The two cuts on pp. 12 and 13, representing filter-presses, might with advantage have been replaced by diagrams.

After a brief account of the main facts about fuels and water, the different chemical industries are considered, about equal space being devoted to those dealing with inorganic and those dealing with organic substances. The accounts of the origin and properties of the raw materials, and of the different operations and transformations through which they pass on their way to the finished products, are clear and concise; in most cases the author has succeeded admirably in subordinating

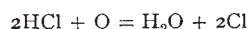
mere detail whilst bringing out clearly the essential factors on which the success of the process depends.

The treatment of some of the more recent developments of technical chemistry is not quite so satisfactory as that accorded to the older industries; the account of the electrolytic processes for the preparation of alkalis and chlorine being perhaps the least satisfactory chapter in the book. The author of a work on industrial chemistry is, of course, hampered to some extent by the natural and inevitable reticence of the inventors of new processes; but, even allowing for this, the chapter might have been improved by a wider acquaintance with the recent literature of the subject. This, in passing, is true, though to a less extent, of the chapter dealing with the cyanide industry in which so much progress has been made of late years.

In speaking of the Deacon chlorine process, on p. 99, the author remarks that since the reaction between hydrochloric acid and oxygen evolves heat, the temperature of the tower in which the reaction occurs should "theoretically" be maintained without further heating, but that this is not the case. In reality, of course, the whole thing depends on the relation between the amount of heat evolved by the chemical change and that lost by radiation, convection, and conduction. He goes on to say:—

"Theoretically, too, all the chlorine of the hydrochloric acid should be recovered, but practically the reaction is far from complete."

Since it is well known that the reaction



is reversible, an equilibrium must tend to be established; this equilibrium will not be displaced by the presence of a catalytic agent (which merely accelerates the velocity with which the equilibrium is approached), so that the practical result is only in disaccord with the incorrect theory.

These are, however, but minor blemishes in a book which attains a very high average of excellence. We are not acquainted with any other book in English which covers the same ground, and there is no doubt that it will prove to be of great service to all persons interested in technical chemistry, and more especially to the students and teachers to whom it most directly appeals. T. E.

VOLCANOEES.

Volcanoes: their Structure and Significance. By T. G. Bonney, D.Sc., LL.D., F.R.S., Professor of Geology at University College, London. Pp. 337. With 12 Plates, a Map, and 21 Illustrations in the Text. "The Progressive Science Series." (London: John Murray. New York: G. P. Putnam's Sons, 1899.)

IN this work the author has succeeded in giving, within convenient limits, a clear and very readable account of the present state of vulcanological science. The work is not burdened with scientific details nor made unattractive by a too technical terminology; but it nevertheless contains a trustworthy discussion of the most recent researches of geologists, and their latest views upon questions connected with these very interesting natural phenomena.

The first chapter, entitled "The life-history of vol-

canoes," contains succinct descriptions of a number of celebrated volcanic outbursts, including that of Vesuvius in A.D. 79, and later eruptions, of Monte Nuovo in 1538, of Stromboli, Bandai-san in Japan, Galoongoon in Java, Krakatoa, Kilauea in the Sandwich Islands, Skaptar Jökull in Iceland, Cotopaxi, Graham Island, and Bogosloff in Behring's Sea; lastly, of the mud volcanoes of Baku, and of Krabla in Iceland, and the geysers of the Yellowstone Park. These examples are admirably chosen to illustrate the varied manifestations, and successive phases of volcanic activity, and serve at the outset to give the student a clear idea of the nature and sequence of the phenomena, which it is the object of the work to explain.

The second chapter deals with "The products of volcanoes," and in it the author has evidently experienced some difficulty in maintaining the popular character of the work, while at the same time supplying accurate petrographical information. The explanation of mineral and rock names being relegated to a glossary, a fairly complete sketch is given of the classification and nomenclature of the igneous rocks. The admirable photographs of rock-sections in this part of the work serve to make the descriptions more intelligible.

In the third chapter, on "The dissection of volcanoes," an account is given of the results obtained from the study of volcanic piles in various stages of degradation under the agencies of denudation. Commencing with the "puys" of Auvergne, which Prof. Bonney describes from personal observation, and going on to the Eifel with its crater lakes, the great lakes of Central Italy and Oregon are alluded to, and then the more or less ruined volcanic cones, and crater rings of Santorin, Etna, and other districts are referred to, to illustrate the salient features of volcanic structures; and in the end illustrations are taken from the still more ruined volcanoes of central Scotland and Hungary, and from the structures which have received the name of laccolites in the western territories of the United States, and the midland district of England.

The next chapter is on "The geological history of British volcanoes," and attempts a chronological sketch of volcanic activity in the British Islands. Prof. Bonney in the main adopts the results arrived at on this subject by the officers of the Geological Survey, though he points out that many of their conclusions are not free from doubt. The sixth chapter, which gives a sketch of "The distribution of volcanoes," brings the descriptive portion of the book to a close. In this part of the work, much information has been incorporated which has been obtained by travellers and others during the last twenty years, and since the time at which most of the earlier English treatises on vulcanology have appeared. The general account of volcanoes all over the globe, with the discussion of the main features of their geographical distribution, is as complete and full as could be expected in some eighty pages, and enables the author to marshal a number of facts which are of the greatest service in leading up to the theoretical speculations to which the seventh and last chapter are devoted.

In referring to Prof. Bonney's remarks upon volcanic theories, it is only fair to point out that he himself admits that he is unable to supply "any complete theory of vulcanicity," and that he thinks we must wait for some

time before any such theory, which will satisfy all the conditions of the problem, will be found. To use his own words:—

"We are, I think, in this position: We have ascertained a number of important facts; many of these suggest conclusions, but some of the latter seem at present difficult to reconcile and harmonise. Indeed it is my opinion that either some link in the chain of evidence still remains to be discovered, or the relation of those which we know is not yet fully understood. In other words, we do not seem to be in a position to put forward a complete explanation of vulcanicity. Nevertheless, I am sanguine that, to borrow an appropriate phrase from a child's game, 'we are getting warm,' and that our successors, by the end of the first quarter of the coming century, will have got much nearer to the solution of the problem."

In spite of this disclaimer on the author's part of any ability to propound a complete theory of vulcanicity, the concluding chapter of the work may be scanned alike by the general reader and the student of science with much profit. An account is given of numerous speculations upon the various portions of the question of vulcanicity, which have of late years attracted considerable attention, and the author's criticisms and suggestions are well worthy of perusal and consideration.

The volume, which is one of the handsome "Progressive Science Series," is admirably printed and fully illustrated; it constitutes a valuable addition to the popular books of science of the day. J. W. J.

OUR BOOK SHELF.

Recueil de données numériques publié par la Société française de Physique, Optique. Par H. Dufét. Deuxième Fascicule. Propriétés optiques des Solides. Pp. vi + 367. (Paris: Gauthier-Villars, 1899.)

THE data collected in this volume should prove of value in physical and chemical laboratories. The first section contains the indices of refraction, and their variation with temperature, of calcite, quartz, fluorine, rock-salt, sylvine (potassium chloride), and common alum. The second collection of tables comprises determinations of the refractive indices, at ordinary temperatures and for various wave-lengths, of glasses of known chemical composition. The optical properties of solid inorganic substances are tabulated in the third section, and of organic bodies in the fourth. These two sections occupy the greater part of the volume, and they should be of particular service to mineralogists and chemical crystallographers. Tables on the influence of temperature on the optical properties of solids, and on the indices of some metals and metallic compounds conclude the work.

The Natural Mineral Waters of Harrogate. By F. W. Smith, M.D. Pp. 101. (London: Dawbarn and Ward, 1899.)

DR. SMITH considers the natural waters of Harrogate chemically, therapeutically, and clinically, with reference to their suitability for drinking and bathing purposes. He maintains that the springs of Harrogate compare very favourably with those of Baden-Baden, Homburg and Kissingen, and that there is no need for invalids to run the risk of a journey to the Continent. Full analyses, by trustworthy chemists, are given of all the varieties of mineral waters with which this Yorkshire spa is endowed, and much valuable information concerning the local rainfall, temperature and mortality should cause this well-illustrated volume to take its place as a handy guide for "the doctors of this country," to whom Dr. Smith dedicates his work.